



A Utility Perspective - Designing Early SSL Incentive Programs

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July 11, 2008

CUSTOMER ENERGY EFFICIENCY
EMERGING TECHNOLOGIES





Presentation Overview

- Energy Efficiency in California
 - Why utilities are interested in SSL Lighting
- PG&E's Emerging Technologies Program
 - Identify and assess emerging technologies to accelerate market penetration
- California IOU LED Lighting Incentives
 - Financial incentives for energy efficient solutions





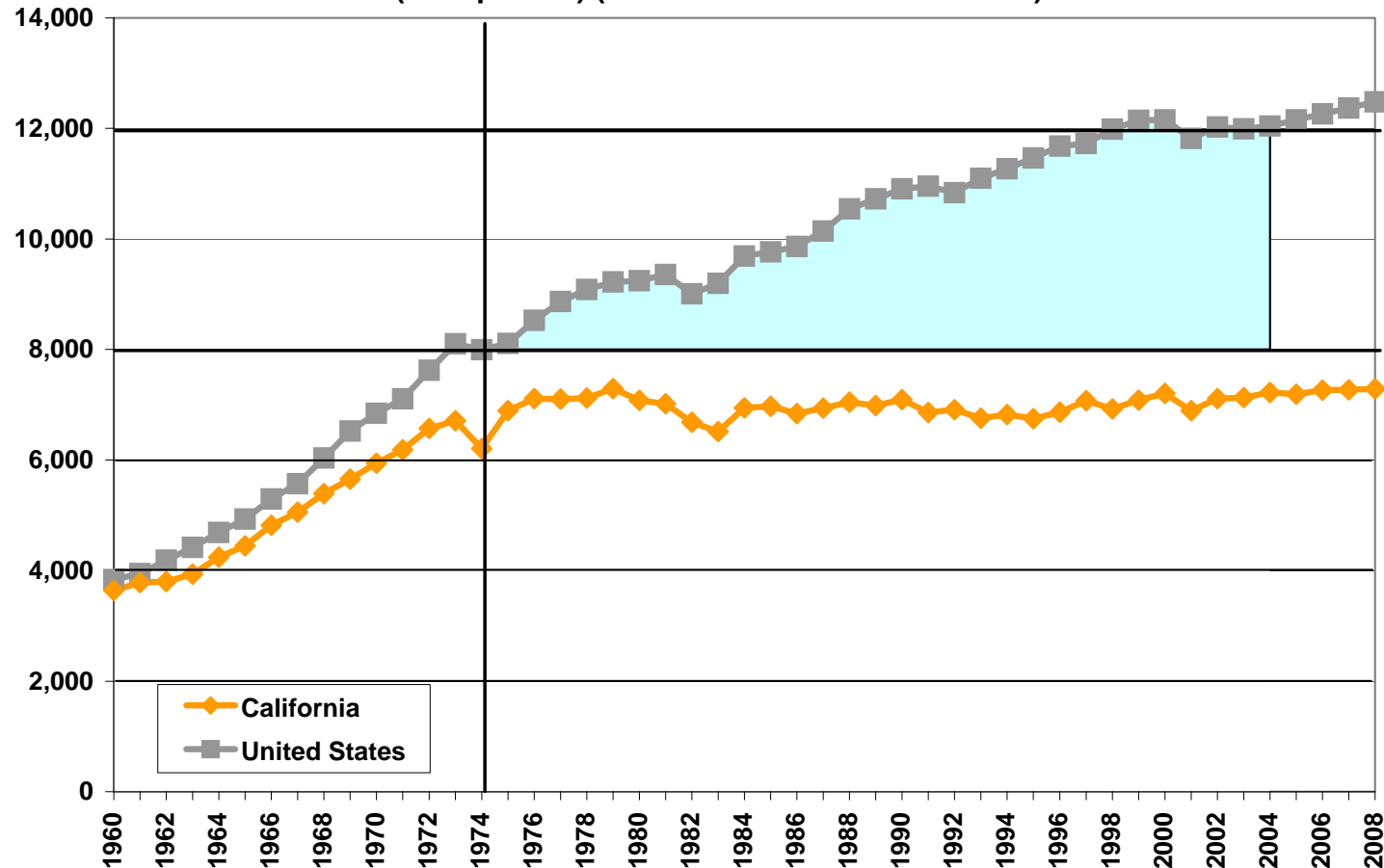
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California has been a leader in energy efficiency for over 30 years

Per Capita Electricity Sales (not including self-generation)
(kWh/person) (2005 to 2008 are forecast data)



Source: CEC 2005

Courtesy of Art Rosenfeld



Energy Efficiency - California's Highest Priority Resource

- “Loading order” to meet new demand
 1. Energy efficiency and demand response
 2. Renewable energy
 3. Clean fossil-fueled distributed generation and clean fossil-fueled central-station generation





Demand Reduction Goals 2006 - 2008

Over 1,400 MW

Total Cumulative Savings



Source: CPUC Decision D.04-09-060



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Energy Efficiency Program Funding

- 2006 - 2008 Three Year Program Cycle: **\$2 Billion** for efficiency
- 2009 - 2011 Three Year Program Cycle:
 - Planning is now underway
 - Goals are higher
 - Funding will likely be higher



California Legislation

- Assembly Bill (AB) 1109 - California Lighting Efficiency and Toxics Reduction Act
 - Goals: By 2018, reduce lighting energy consumption
 - By 50% for Residential Indoor
 - By 25% for Commercial and Outdoor





- Energy Efficiency and Climate Change
 - Will be drivers for adoption of emerging energy efficient technologies, including Solid State Lighting





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Mission Statement

- Identify and assess emerging technologies to **accelerate** market penetration



PG&E's Emerging Technologies Program

Field Assessments

- Evaluate Energy Savings
- Evaluate Lighting Characteristics
- Publish Results
 - Emerging Technologies Coordinating Council Website www.etcc-ca.org
- Support Incentive Program Development

Pacific Gas and Electric Company
Emerging Technologies Program
Application Assessment Report #0714
LED Street Lighting
Oakland, CA
Issued: January 2008
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Development of New Incentive Programs

- Identify and verify solution
- Develop regulatory materials
- Calculate cost effectiveness
- Roll-out
 - Market introduction
 - Utility incentives validate worth

**Pacific Gas and Electric Company
Lighting Catalog
Energy Efficiency Rebates for Your Business**

Carefully read the specifications below to determine that you are installing a qualifying product. You must attach the manufacturer's specification sheet documenting the characteristics of lamps, ballasts and fixtures.

FIXTURES

INTERIOR LINEAR FLUORESCENT FIXTURES

Only complete new T8 or T5 or High Output (HO) T5 fixtures qualify. New fixtures must not exceed the maximum Wattage listed in the rebate table below for each range of lamp Wattage being replaced. *Fixtures must be equipped with linear fluorescent lamps and ballasts that meet the specifications defined in the T8 or T5 Linear Fluorescent Lamps with Electronic Ballasts category. New fixtures must replace, one-for-one, existing Incandescent, Mercury Vapor, T12/High Output Fluorescent, T12/Very High Output Fluorescent, Standard Metal Halide, or High-Pressure Sodium Fixtures in interior installations. Existing Pulse Start Metal Halide installations do not qualify. Exterior installations do not qualify. All fixtures must be hardwired. Fixtures are not eligible for additional rebates under the Compact Fluorescent Fixtures and T8 or T5 Linear Fluorescent Lamps with Electronic Ballasts categories, but may qualify for an occupancy sensor rebate under the Occupancy Sensor category, provided all requirements are met. To qualify for the 400 Watt and > 400 Watt categories, fixtures must be installed at a height over 12' above the finished floor.

Product Code	Rebate/Unit Measure
L95	>400 Watt lamp basecase, up to 400 Watt replacement fixture \$125.00/Fixture
L292	400 Watt lamp basecase, up to 244 Watt replacement fixture (Tier 1) \$100.00/Fixture
L96	400 Watt lamp basecase, 245 to 340 Watt replacement fixture (Tier 2) \$75.00/Fixture
L956	175-279 Watt lamp basecase, up to 192 Watt replacement fixture \$75.00/Fixture
L955	101-175 Watt lamp basecase, up to 128 Watt replacement fixture \$50.00/Fixture
L954	<100 Watt lamp basecase, up to 44 Watt replacement fixture \$35.00/Fixture

COMPACT FLUORESCENT FIXTURES

Only complete new Compact Fluorescent fixtures qualify. New fixtures must not exceed the maximum Wattage listed in the rebate table below for each range of lamp Wattage being replaced and must have a lower Wattage than the fixture being replaced. *Fixtures must be equipped with Compact Fluorescent Lamps and electronic ballasts. CFL ballasts must be Programmed-start or Programmed-Rapid-start with a Power Factor (PF) of > 0.90 and Total Harmonic Distortion (THD) of < 20%. New fixtures must replace, one-for-one, existing Incandescent, Mercury Vapor, T12/High Output Fluorescent, T12/Very High Output Fluorescent, Standard Metal Halide, or High-Pressure Sodium Fixtures in interior installations. Exterior installations qualify for existing lamps < 100 Watts only. Existing Pulse Start Metal Halide installations do not qualify. All fixtures must be hardwired. Fixtures are not eligible for additional rebates under the Interior Linear Fluorescent Fixtures and T8 or T5 Linear Fluorescent Lamps with Electronic Ballasts categories, but may qualify for an occupancy sensor rebate under the Occupancy Sensor category, provided all requirements are met. To qualify for the > 400 Watt category, fixtures must be installed at a height over 12' above the finished floor.

Product Code	Rebate/Unit Measure
L965	Interior > 400 Watt lamp basecase, up to 392 Watt replacement fixture \$45.00/Fixture
L964	Interior 175-279 Watt lamp basecase, up to 275 Watt replacement fixture \$20.00/Fixture
L963	Interior 101-175 Watt lamp basecase, up to 160 Watt replacement fixture \$20.00/Fixture
L962	Interior < 100 Watt lamp basecase, up to 70 Watt replacement fixture \$17.00/Fixture
L960	Exterior < 100 Watt lamp basecase, up to 70 Watt replacement fixture \$17.00/Fixture

INTERIOR PULSE-START METAL HALIDE FIXTURES

Complete new Pulse Start Metal Halide Fixtures or Retrofit Kits qualify as replacements. Retrofit kits may be used on existing Mercury Vapor, Standard Metal Halide or High-Pressure Sodium Fixtures only. New fixtures or retrofit kits must not exceed the maximum Wattage listed in the rebate table below for each range of lamp Wattage being replaced and must have a lower Wattage than the fixture or lamp being replaced. *Replacements must be equipped with Pulse Start Metal Halide lamps and either magnetic or electronic ballasts. Basecase Lamp Wattages below 175 Watts do not qualify under this category. New fixtures must replace, one-for-one, existing Incandescent, Mercury Vapor, T12/High Output Fluorescent, T12/Very High Output Fluorescent, Standard Metal Halide, or High-Pressure Sodium Fixtures in interior installations. Exterior installations do not qualify. All replacements must be hardwired. Fixtures may qualify for an occupancy sensor rebate under the Occupancy Sensor category, provided all requirements are met. To qualify for the 400 Watt and > 400 Watt categories, fixtures must be installed at a height over 12' above the finished floor.

Product Code	Rebate/Unit Measure
L968	>400 Watt lamp basecase, up to 820 Watt replacement fixture (Tier 1) \$100.00/Fixture

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*Rebate Note: In all cases, the Wattage of the replacement fixture must be less than the Wattage of the existing lamp. The maximum replacement Wattage listed in the table for each category is typically associated with the highest Wattage in the basecase range.

Program Development Challenges

- Variable Product Quality
- High Cost - Marginal Total Resource Cost (TRC)
- Setting Incentive Levels
- Rapid Technology Advancements
- Customer Education



Program Development Opportunities

- Lots of interest for incentives from vendors and customers
- Significant energy savings
- Long product life
- High customer satisfaction





Standards Based Incentive Approach

- Benefits
 - Maintain high quality
 - Support DOE Energy Star and industry-standard test methods
 - Send signal to the market that quality matters
- Results
 - Higher customer satisfaction
 - Persistent, reliable energy savings



Standards Based Incentive Approach

- Track DOE Energy Star Standards
 - Require LM-79 test results
 - Require proof of submittal for Energy Star qualification
 - Where no Category A Energy Star, develop CA standard
- Product Qualifying Database
 - Reference Energy Star where overlap





Initial Pilot Program

- High Initial Incentive Levels
 - Incentive levels will be lowered as costs decline and market matures
 - Allow marginal cost effectiveness
- Revise with Product Advancements
 - Update qualifying standards and product database as technology advances
- Customer Education



Planned Incentives

Refrigerated Case Lighting

- Upstream Rebate and/or Downstream
- Two-tier Incentive
 - Standard rebate of \$45 per 5' door
 - Minimum efficacy of 25 lumens per watt
 - Maximum watts per door of 50 watts (5' center door)
 - Premium rebate of \$60 per 5' door
 - Minimum efficacy of 35 lumens per watt
 - Maximum watts per door of 38 watts (5' center door)



Planned Incentives

Recessed Downlights

- Downstream
- Mirrors Energy Star requirements



Others?



LLF, Inc.

Planned Incentives

Street and Area Lighting

- Not Category “A” At Present
- CA Standards under development in coordination with DOE Energy Star
- ? of “White” light acceptance



Relume



LED Power



Beta LED

Others?



Planned Incentives

Parking Garage Lighting

- Popular application - Peak demand savings
- Marginal success in ET Assessments
- New fixture designs show promise

Others?



Lighting Science



Beta LED

Planned Incentives

MR-16

- Probably the most requested incentive
- No more efficient than the best Halogen
- Savings - less light at similar lumens/watt
- How much are we over lighting?



Lamina

Others?

IMS

Summary

- **Energy Efficiency** will be a major driver for emerging solid-state lighting technologies
- California utilities are **actively involved**
- **New incentives** are on the way (deemed)
 - be **simple** to process and deliver to customers
 - include **product qualifying** standards to help ensure customer satisfaction and **persistent, reliable energy savings**



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